PD-AAK-691

TRIP REPORT

Date submitted 2-7-80

NAME G. L. Corey TITLE Water Management Specialist DIV./UNIT DS/AGR/TSI

PERIOD OF TRAVEL (including dates) January 15 - February 1, 1980

ITINERARY Egypt

(Use attachment for details, including time schedule)

PURPOSE Review possible projects and programs to improve irrigation water distribution system.

ORGANIZATIONS AND PERSONS CONTACTED:

(Use attachment for details.) N. E. the Minister of Irrigation and various department heads and personnel within the ministry. Field visits to Fayoum and Garbia Governates and to the new lands area east of the delta.

RESULTS/ACCOMPLISHMENTS:

1. Held discussion meetings with USAID and World Bank representatives.
2. Presented findings to Ministry of Irrigation.
3.

Etc.

FOLLOW-UP ACTION REQUIRED:

(indicate what, by whom, when.)

USAID and World Bank will decide course of action based on findings and further discussions with G.O.E. officials.

OTHER REMARKS:

(May include other information, observations, and impressions of general interest.)

This review was conducted with Dr. E.V. Richardson, Colorado State University and three representatives of the World Bank: Fred Hotes, Abdul Rehman and Dr. Osman.

Attachments:

(List) Report
Ministry of Irrigation Proposals
Itinerary

Distribution:

(List)

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Dr. E. Richardson, Colorado State University
Fred Hotes, World Bank

UNITED STATES GOVERNMENT

memorandum

DATE: February 6, 1980

REPLY TO ATTN OF: DS/AGR/TSWM, Gil Corey

SUBJECT: Trip Report - Richardson/Corey

TO: USAID/Cairo, Dr. Jerry Edwards

Attached is a copy of the trip report prepared by Dr. E. V. Richardson and myself. Ev was going to try to get this typed in Egypt before he left. If so you probably already have copies. You may discover however some minor differences because we were not able to edit our very rough version together, so this copy represents my edited version.

Fred Hotes, World Bank suggests that we (Richardson and I) get together with him in late February to work on the table since it presently is certainly very rough and represents much more than could be realistically started at one time.

I enjoyed the assignment and hope that we were able to provide some information helpful to the Mission's development of strategy in this important area.

IMPROVING IRRIGATION IN EGYPT

Technical Report - G. L. Corey, DS/AGR
E. V. Richardson,
AID Consultant

The overall irrigation system in Egypt, at first glance, appears to be rather simple. There is a reservoir at the supply end which captures the total source flow of the Nile; the system is self-contained (no diversions to or from it); and apparently the outflows to the sea are quantifiable.

This simplicity has led to preparation of much gross information regarding the system. One finds water use, water requirements, irrigation demands, etc. presented by quantifying the gross inflows and outflows to and from the cropped areas. Much analysis and descriptive information is based on these data.

The problem with this type of analysis is that one must speak of gross averages when lumping the entire irrigated acreage into one assessment. This can lead to inaccurate information and certainly incorrect conclusions for a specific area within the overall system. The variance from the average is undoubtedly very large.

In reality the system is highly complicated with drainage water reentering the system many times over through open drains and underground seepage. The water distribution and use by farmers is a complicated system of rotation within a canal system coupled with rotation among farmers on the farm to farm distribution system.

It is apparent that not enough is known about how the water is distributed and used within the overall system. The Ministry of Irrigation recognizes this as evidenced by the current programs entitled "Master Water Plan" (MWP) and the "Egyptian Water Use and Management Project" (EWUP). Better water management is recognized as a possible source of water for expanding irrigation to new areas. Current proposals by the Ministry indicate a desire for better information and improved management within canal command areas.

Coupled with the insufficiency of information on system operation and associated problems is a profussion of ideas and projects for system improvement, rehabilitation, and expansion. There certainly are more project ideas than existing money or personnel can manage. There is therefore a need within the Ministry of Irrigation for a capability to prepare, evaluate, and prioritize projects. Such a capability must include development and maintenance of a data base from which to make decisions. There has been a start in this development. There is need for more attention to it. Without good knowledge of the internal workings of

the irrigation system one cannot accurately assess the effect a given program might have on the system as a whole. For example: leaky gates are said to be a significant problem and this is certainly true when one looks at the canal delivery system. However, much irrigation of land is accomplished from the leakage and the consequences of stopping all leaks needs careful analysis.

Several project possibilities were analyzed before preparing this report. The analysis was based on discussions within the Ministry of Irrigation; site visits to three possible project areas; a review of a great deal of written information associated with irrigation problems; and our prior experiences in Egypt. This analysis certainly does not represent any detail regarding feasibility and should not be considered more than pre-reconnaisance.

The Ministry of Irrigation presented the review team with a summary list of project proposals, Attachment B. The table, Attachment A, includes all of these proposals along with others which during the discussions surfaced as also being important.

Following are brief descriptions of those projects and programs, listed in the table, which we feel are high priority activities and ones which appear to be consistent with AID's congressional mandate.

I. Planning and Management Within the Ministry

The Ministry feels a need to increase its capability to plan, manage, and carry out feasibility studies on irrigation projects and has requested technical assostamce for such a program.

The lack of a centralized data base, the apparent lack of coordination among improvement projects within the Ministry and across Ministries, the need to synthesize all existing information, and collect additional data, all indicate that this activity is highly important to the Ministry of Irrigation. The desire to expand irrigated acreage and effectively use all of Egypts' share of the Nile waters makes it essential that the Ministry improve its capacity to understand the total system, quantify accurately the operation of the system, synthesize all available information and data at a central place, and to use all of this knowledge and information in orderly planning of future projects of improving the existing system and expanding into new lands; the economical and financial impacts of future irrigation projects on the nations budget, development progress and the Ministry's major expenditures must be monitored. Additional moneys will have to be made available from the national budget as a systematic approach to improvement is implemented. Without this there will be a good chance of disasterous results because new land expansion cannot proceed without limit without much better control within the existing system.

The "Water Master Plan" is a start at total system understanding and data base collection. This project is however directed at the macro system and its result needs to be meshed with the on-farm operational system because the macro system (river, canals and drains) only exist to serve the micro system (on-farm delivery and field use).

The "unit" or "units" within the Ministry which would be charged with data base management should be carefully selected and institutionalized such that there is free flow of information from operational and researc arms of the Ministry to the "center" and, after analysis, back to the operational arms of the Ministry. This should not be considered a pilot or research effort. It must become an important component of the Ministries planning and operational activities.

The program described here is represented in the table as I, A and B.

2. Training

The Ministry has strongly indicated a need to provide training to its professional and non-professional staff. This need was expressed by the Minister, Senior Under Secretaries, Department Heads, chairmen of the companies and individual engineers. The Ministry has established a new training center and has requested technical assistance in building up its technical capabilities. The Ministry has also contacted several Egyptian Universities to provide specialized training in areas where there are deficiencies in training. Many of these deficiencies are at the technical level, (gate keepers, stream gagers, farm irrigation advisors, etc.). In addition, it is recognized that most engineers need continuing education programs to maintain and increase their skills. Our observations indicates that there is a need for an organized training program in the Ministry.

Training should be provided at the project level such as in the Water Master Plan and Egypt Water Use and Management Project. But also technical assistance should be provided to help the Ministry establish a sustained continuing education program and training center as requested. The training center to: (1) coordinate the training programs in various projects; (2) to establish on-the-job training programs in every area of the ministry; (3) to work with the various universities and the Ministry of Education to incorporate courses and training programs in needed skills;; (4) to develope specialized short course to teach special skills to the Ministry needs; (5) to develope a cooperative program with U.S. and Egyptian universities for advance degrees (a model could be for professionals in the Ministry to work on advanced degrees at an Egyptian university after one or two semisters of work in the U.S. The thesis would be done in Egypt on an Egyptian problem. His committee could consist of an American professor who could travel to Egytp to advise on his research); (6) to provide video tape (media based) courses. These could be similar to the SURGE Program at Colorado State University or the AMCEE Program conducted by seventeen leading universities in the

U.S. The SURGE Program provides graduate training by video taping, on going courses at Cororado State University. A masters degree can be obtained with the student never being on campus. To be viable a teacher visits the plant or discusses the course by phone with the student. AMCEE is the association for media based continuing education for engineers. The association included MIT, Stanford, C.S.U., Georgia Tech and Michigan. It provides a cataloge each year containing over 1000 courses that are available; (7) it could encourage both professional and non-professional employees to increase their skills; (8) it could provide training materials for agricultural extension agents one better, water management, and (9) the center could provide training for other African nationals, especially those in the Nile Basin.

3. Management, Operation and Maintenance:

Management of the over-all distribution system requires timely (daily) knowledge of the flow in the Nile and major canals. This is needed to schedule releases from the High Dam to meet the changing irrigation demands and to optimize power production. Without this information water is wasted, power generation is lost and some districts get too much water whereas others do not get enough. This knowledge is also needed to provide the data base for future planning.

To obtain this information requires communication, telemetering and water management. The communication system should not be established for the sole purpose of the telemetering requirement but should be established to link the Ministry with all its activities and for most effective use of funds to be used by other ministries, in particular the Ministry of Agriculture experiment stations and extension service. They would not use the same frequencies but only share the common facilities such as towers and relay stations.

The communications and telemetering system should not be established as one system; rather it should be built up in blocks.

The Ministry presently has a computer console and telemetry system as a pilot project. This should be expanded in phases (blocks). A feasibility study would establish the phases and economic justification for the system It appears that the next phase would be to establish telemetering to the dams at Aswan and the barrages.

The telemetering is only as good as the information it sends. Therefore technical assistance is needed to increase the capacity of the Ministry to collaborate and check the calibration of the flow measuring structures. That is, water measurement. This capacity should also be extended down to the district level and increase the reliability of the data base.

Operation and maintenance is also an important element of any irrigation system operation. Technical assistance is needed to provide guidance and assistance in placing O & M into an organized system linked to planning on the one hand and operation on the other.

This program would be directed to a determination of how the O & M system presently operates including inputs into it and outputs from it. Along with this the overall purpose would be to evaluate procedures equipment and funding management; to standardize procedures and equipment use; to evaluate costs; and finally develop a system which links costs, feasibilities, inputs, system operation and its interface with the on-farm practices.

After these studies the O & M operation can then be organized appropriately with the necessary equipment and personnel and made operational. Investments in O & M could then be considered and rehabilitation and upkeep of the delivery system accomplished in a systematic way.

4. On-farm Water Management and Delivery System Technical Project - Irrigation Development and Management

This program would include remodeling the irrigation network and establishing improved water management practices on farms. A District or portion of a District would be chosen for complete renovation and study. On-farm practices might include improvement of the watercourse system, land leveling and field layout, power for lifting water to the field level, farmer organizations, altered scheduling of water, conjunctive use and better drainage.

The program should include an initial stage where specific site problems are identified by a data collection process and a feasibility study made to determine specific practices to be implemented within the area. This stage might require one year to complete.

Whatever water management practices might be introduced in the District area, there should be another component of the program which identifies irrigation water delivery problems on a much larger scale than the district level. This would consist of a detailed data collection process on a large canal system which included the on-farm improvement are discussed above. Data collected would include canal and drainage system hydraulics (discharge and level) over time, canal maintenance records (problems and costs), cropping patterns under the system, and operational procedures used in managing the system.

The results from this complete program would provide information essential

to good management and improvement of the overall system. Such information is not presently known. From this study an integrated program can be developed within the Ministry of Irrigation which will continually be improving the system. Budget planning activities, operation and maintenance, water scheduling, and horizontal expansion can then be placed on a systematic track which continually improves the total irrigation system. Without this type of program, crisis management will continue and a particular project effects on the system are only known after implementation and establishment.

Two areas have been suggested for such a program - Garbia and Fayoum. Reconnaisance of each suggests that either is suitable. During project development other sites should undoubtedly be investigated. Of importance is selection of an area where there is a sufficiently isolated canal system to obtain good records which are not influenced by adjacent areas. The isolation of Fayoum and the critical problem of no surface drainage outside the area certainly suggest that the program would have great impact on production in that area. However, the Delta area represents a much larger portion of the total agriculture of Egypt. Regardless of site selection, a properly developed and executed program will provide replicable results and importantly can provide the Ministry with information necessary for better management of the overall Nile irrigation system.

In addition to an implementation program there is need to continue an on-farm water management applied research program to identify problems, search for solutions and develope additional implementation programs to increase the social and economic well being of the farmer. This could be a continuation/expansion of EWUP in other pilot areas.

5. Capital Investment

Several items were presented which represent large capital expenditures and appear in section III of the table.

There is an apparent need for rehabilitation and/or replacement of three upper-Nile barrages. Presently, however, there is no concrete plan because sufficient data are lacking. There is a need to immediately appoint a "consulting panel of experts" (a World Bank requirement) and perform a feasibility study on all three barrages. From information already gathered the Esna Barrage appears to be critically in need of repair. Future investments in barrage repair and reconstruction will be large but specifics will have to await feasibility studies and development of plans.

There are also several structures within the irrigation delivery system

which are in critical need of repair. These have been identified by the Ministry and are presented in the table under III B. Other projects presented in the table under Capital Investments involve new land development which should be deferred until the above described programs are in place.

ATTACHMENT A

IRRIGATION SYSTEM PLANNING, MANAGEMENT, AND CAPITAL INVESTMENT PROGRAM

Note: This table should not be regarded as anything more then tentative. Costs are based on some information provided by the Irrigation Ministry but in general it is guess work on our part. It is not intended that all activities could be started at once. In fact, the Ministry's human and financial resources preclude that.

	1981	1982-1985	Total
	LE(000)		(50,300)
I. Strengthen Min. of Irrigation			
A. Water Resources Planning(WMP)			(4,800)
1. Data Management	600	1400	2,000
2. Economic Analysis	400	1100	1,500
3. Planning	200	800	1,000
4. Training	50	250	300
B. Project Design Capability			(21,000)
1. Economic Analysis	200	800	1,000
2. Design	600	1400	2,000
3. Evaluation	100	1900	2,000
4. Field Studies	200	14800	15,000
5. Training	200	800	1,000
C. Management Operation & Maintenance			(24,500)
1. Communications	300	10000	10,300
2. Telemetering	100	4100	4,200
3. Water Measurement	250	3150	3,400
4. Operation & Mainenance	300	3500	3,800
5. Training	250	2550	2,800
			(153,800)
II. Technical Oriented Projects			(153,800)
A. Irrigation Water Delivery System Improvement			
1. Implementation in Garbia Governate			(57,500)
a) District Level	150	15850	16,000
b) Total Area	300	41200	41,500
2. Implementation in Fayoum Governate			(65,300)
a) District Level	150	15850	16,000
b) Total Area	300	49000	49,300
3. On-farm Water Management Development Program			(15,000)
a) Implementation	1000	5000	6,000
b) Research	1200	4800	6,000
c) Advisory Service	600	2400	3,000
Operation & Maintenance Project	300	15000	15,300
C. Drainage Design	100	600	700

	1981	1982-1985	Total
III. Capital Investment			
A. Upper Nile Barrages - Esna, Nag - Hammadi and Assuit			
a. First Option - Strengthening & Renovation Works of Three Barrages			
1. Consulting Panel	100	200	300
2. Review of work done regarding Esna and decision as to retain existing barrage and feasibility studies	150	100	250
3. Strengthening & renovation-designs	200	800	1,000
4. Execution with locks		77000	77,000
Sub-total 2(a)	450	781000	78,550
b. Second Option - Strengthening Nag-Hammadi and Assuit and New Barrage at Esna w/o Power House			
1. Consulting Panel	50	300	350
2. As per a-2 above	150	100	250
3. Construction Dsgn.	200	3000	3.200
4. Strengthening Two Barrages Nag-Hammad and Assuit with new Locks	-	160000	160,000
Sub-Total 2-b	400	213400	213,800
B. Rehabilitation of Structures of Canal System			
1. Prelim Survey and Identification of structures requiring Rehabilitation and Detailed Feasibility	200	300	500
2. Construction Designs	-	2500	2,500
3. Execution	-	100000	100,000
Sub-totals (3)	200	102800	103,000
C. Fayoum: Pumping Station to Lift Water from Drains & Structures			
a. 1. Investigations and Feasibility Study	100	100	200
2. Construction Deigns	-	500	500
3. Execution	-	6000	6,000
Sub-total (a)	100	6600	6,700
If Irrigation & Drainage Infrastructure is to be built for 35,000 feddams	-	50000	50,000
Sub-total 2-b		50000	50,000

D. West Samalout Rehabilitation

1. Investigation and Feasibility Report	150	50	200
2. Construction Designs	-	500	500
3. Execution	-	8000	8000
Sub-totals	150	8550	8700

E. Es-Salam Canal up to Suez

1. Investigation, Studies, and Feasibility Report	150	750	900
2. Construction Designs	-	1600	1600
3. Main Canal	-	-	200000
4. Drainage and Distribution Works	-	290000	90000
Sub-totals (excluding main canal)	150	292350	292500

Summary

I	A	Water Resource Plan	4800
	B	Project Design	21000
	C	Management- O&M	
		1. Comm.& Tele	14500
		2. Water Meas.	3400
		3. Dist. Syst. O&M	1300
		4. Improv O&M	2500
		5. Training	2800
		Total	50300
II	A	Water Dal. Imp. Projects	
		1. Implementation	
		a. Ghorbiz	57500
		b. Fayoum	65300
		2. On-Farm Program	15000
	B.	O&M Imprv. Project	15300
	C.	Drainage Design	700
		Total	153800
III	A.	Nile Barrages	213800
	B.	Canal Structures	103000
	C.	Fayoum Pumping	6700
	D.	West Samalout	8700
	E.	El Salam Canal	292500
			624700
		Total	828800

SUMMARY OF PROJECT PROPOSAL ON EGYPT IRRIGATION SYSTEMS MANAGEMENT, IMPROVEMENT AND IMPLEMENTATION AND PRIORITIES

The Ministry of Irrigation has submitted some background material concerning a project proposal entitled "Egypt Irrigation Systems Management, Improvement and Implementation Project"

The project covers many problems areas which may be divided under sub-titles according to Ministry's priorities. The following snow two groups of priorities one for financing considerations, and the other for technical assistance.

GROUP ONE FOR FINANCING CONSIDERATION:

Irrigation Development and Management

The project is suggested to give careful consideration to the development of the field irrigation system in Garbia Governorate. In this Governorate tile drainage projects have been executed or under execution. This choice would show what benefits can be expected from combination of field drainage and water management. The program would include remodeling of the irrigation networks in the Governorate and using proper management practices which proved to be successful in pilot project areas.

2. Remodeling and Construction of Major Nile Barrages:

The life of some of the major barrages on the Nile is already over. Two plans have been prepared. The first, which is a short term one, deals with the strengthening, consolidation and protection of the existing barrages. The second, which is a long term plan, aims at the construction of new barrages to replace the old ones.

3. Rehabilitation of the Irrigation System:

The irrigation system network is in bad need to development Many structures have deteriorated and need renewal or impr ment. Some regulator gates still consist of wooden stop logs. A recent survey of the system within each irrigati directorate has been carried out. Structures needed and cost estimates are prepared on the national level.

4. Re-Use of Drainage Water in the Fayoum Governorate :

The trend of utilizing drainage water for irrigation purpo is not a new practice in Egypt. Drainage water has been actually utilized in Middle Egypt since about a century. A recent estimate of all drainage water in lower Egypt amounts to about 13 milliard m^3. The Ministry of Irrigation is preparing now a master plan for the re-use of this drainage water. Among the projects which have

priority is the Fayoum Governorate project. Five station with other structures have been designed.

5. Rehabilitation of the Irrigation System in the Samalout Area:

Samalout area in Minya Governorate is one of the old-new areas which have been reclaimed after the High Dam. The area suffers from unefficient irrigation system and mismanagement of the available water resources. A report has been recently prepared that covers the main constraints and adequate proposals. Among these, is the re-construction of the irrigation pumping stations and the remodeling of the irrigation system.

6. Implementation of the Field Irrigation System of El-Salam Canal Area:

The El-Salam canal will serve an area of 200,000 feddans in the eastern Delta part. The main canal, control works, and pumping stations have been designed and construction will start soon. For many similar reclamation projects; it has been shown that proper design and implementation of field irrigation systems is necessary. The Ministry Irrigation is giving this project a proper consideration if funds are available.

7. Communicatin System:

Effective management of water resources in Egypt require measurements of water levels and flow rates on daily basis at barrages and main distribution points of the system. This data must be processed quickly. A pilot telemetering system has been started with a flexible computer facilities to allow an expansion for a network up to 200 stations. It is suggested that these additional stations be implemented on the River Nile and main distribution points with a total additional cost of 5 million U.S. Dollars.

GROUP TWO FOR TECHNICAL ASSISTANCE:

1. Establishment of a Regional Training Center for Water Management and Drainage

The EWUP Project has initiated a training program in water management, which proved to be very useful and efficient, for the proposed national project for rehabilitation of the irrigation systems and water management and other similar activities will require envolvement of many other field irrigation and agricutural specialists in similar training programs. The Ministry has decided to establish a new training center. Technical assistance in building up the technical capabilities of the center is required

2. Planning and Management:

There is a great need to increase the capabilities of the Ministry to plan, manage, and carry feasibility studies of irrigation projects. Modern economic tools, management, and design procedures are among the areas where technical assistance is needed. The Ministry has established a unit which would need strengthening

Program for Advisory Review Mission (USAID & IBRD)

January 16	Visit water management project - El Mansouria.
January 17	11:am meet with Mr. Brown, USAID.
January 19	9:am meet with H. E. Minister of Irrigation.
	11:am seminar on water pricing.
January 20	9:am meet with Under Secretaries for Water Distribution, Projects, and Dams and Barrages.
	11:am presentations by WMP and EWUP.
January 21	8:am meet with Drainage Authority.
	11:am meet with Manpower, Design, Planning officials.
	12: meet with UNDP and FAO representatives.
January 22	Visit Fayoum Area.
January 23	Visit Delta Barrage, telemetering project, Dredging company.
January 24	Visit Garbia Area.
January 26	Visit eastern delta area and El Salam Canal.
January 27, 28, 29	Meetings and discussions among USAID and World Bank.
January 31	Meeting with Minister of Irrigation.